

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method of recognizing an object based on pattern matching using a gray-scale normalized correlation method, comprising:

storing a reference image including a foreground and a background, said foreground and said background each having a predetermined value of density distribution;

inputting an image of the object, said image including a foreground and a background, said foreground and said background each having a predetermined value of density distribution;

storing a function for giving said predetermined values of density distribution of said reference image corresponding to said predetermined values of density distribution of said input image, respectively, said function providing a predetermined form pattern, ~~such that~~ in which one of said predetermined values of density distribution of said foreground and said background of said reference image is high, and another is low, the predetermined form pattern including one of a convex pattern and a concave pattern; and

obtaining a normalized correlation coefficient between said reference image and said input image using said function.

Claims 2 – 3 (Canceled).

4. (Previously Presented) The method as claimed in claim 1, wherein said function is obtained by designating a pattern of said reference image, overlaying an image of said pattern on said input image, and designating one of a predetermined value of density distribution of said image and a predetermined value of density of said image.

5. (Previously Presented) The method as claimed in claim 1, wherein said function is obtained by extracting an outline of the object, overlaying an image of said outline on said input image, and designating one of a predetermined value of density distribution of said image and a predetermined value of density of said image.

Claims 6 - 11 (Canceled)

12. (Currently Amended) A medium for recording a computer program having a method of recognizing an object based on pattern matching using a gray-scale normalized correlation method, the method comprising:

storing a reference image including a foreground and a background, said foreground and said background each having a predetermined value of density distribution;

inputting an image of the object, said image including a foreground and a background, said foreground and said background each having a predetermined value of density distribution;

storing a function for giving said predetermined values of density distribution of said reference image corresponding to said predetermined values of density distribution of said input image, respectively, said function providing a predetermined form pattern ~~such that~~ in which one of said predetermined values of density distribution of said foreground and said background of said reference image is high, and another is low, the predetermined form pattern including one of a convex pattern and a concave pattern; and

obtaining a normalized correlation coefficient between said reference image and said input image using said function.

Claims 13 – 17 (Canceled).

18. (Currently Amended) A method of recognizing an object based on pattern matching using a gray-scale normalized correlation method, comprising:

- storing a reference image including a foreground and a background, the foreground and the background providing a predetermined contrast pattern;
- inputting an image of the object, the image including a foreground and a background, the foreground and the background providing a predetermined contrast pattern;
- obtaining a function for giving the predetermined contrast pattern of the reference image corresponding to the predetermined contrast pattern of the input image, the function providing a predetermined form pattern, the predetermined form pattern including one of a convex pattern and a concave pattern; and
- calculating a normalized correlation coefficient between the reference image and the input image using the function.

Claims 19 – 24 (Canceled).

25. (Previously Presented) The method as claimed in claim 18, wherein the obtaining step is carried out by designating a pattern of the reference image, overlaying an image of the pattern on the input image, and designating one of a density distribution of the image and a density of the image.

26. (Previously Presented) The method as claimed in claim 18, wherein the obtaining step is carried out by extracting an outline of the object wherein an area inside the outline serves as the foreground and an area outside the outline serves as the background, overlaying an image of the outline on the input image, and designating one of a density distribution of said image and a density of the image.

27. (Currently Amended) The method as claimed in claim ~~48~~ 36, wherein the calculating step is carried out by simple summation of a cross-correlation coefficient between the reference image and the input image.

Claim 28 (Canceled).

29. (Currently Amended) The method as claimed in claim ~~28~~ 36, wherein the calculating step is carried out with a term of the background of the reference image excluded from an equation of an autocorrelation coefficient of ~~each of the reference image and the input image~~ and an equation of a cross-correlation coefficient between the reference image and the input image.

30. (Currently Amended) A medium for recording a computer program having a method of recognizing an object based on pattern matching using a gray-scale normalized correlation method, the method comprising:

storing a reference image including a foreground and a background, the foreground and the background providing a predetermined contrast pattern;

inputting an image of the object, the image including a foreground and a background, the foreground and the background providing a predetermined contrast pattern;

obtaining a function for giving the predetermined contrast pattern of the reference image corresponding to the predetermined contrast pattern of the input image, the function providing a predetermined form pattern, the predetermined form pattern including one of a convex pattern and a concave pattern; and

calculating a normalized correlation coefficient between the reference image and the input image using the function.

Claim 31 (Canceled).

32. (New) The method as claimed in claim 1, wherein the convex pattern includes a rectangular pattern.

33. (New) The medium as claimed in claim 12, wherein the convex pattern includes a rectangular pattern.

34. (New) The method as claimed in claim 18, wherein the convex pattern includes a rectangular pattern.

35. (New) The medium as claimed in claim 30, wherein the convex pattern includes a rectangular pattern.

36. (New) A method of recognizing an object based on pattern matching using a normalized correlation method, comprising:

- storing a reference image including a foreground and a background;
- separating the foreground and background of the reference image from each other;
- inputting an image of the object; and
- calculating a normalized correlation coefficient between the foreground of the reference image and the input image.

37. (New) A medium for recording a computer program having a method of recognizing an object based on pattern matching using a normalized correlation method, the method comprising:

- storing a reference image including a foreground and a background;
- separating the foreground and background of the reference image from each other;
- inputting an image of the object; and
- calculating a normalized correlation coefficient between the foreground of the reference image and the input image.

38. (New) The medium as claimed in claim 37, wherein the calculating is carried out with a term of the background of the reference image excluded from an equation of an autocorrelation coefficient of the reference image and an equation of a cross-correlation coefficient between the reference image and the input image.

39. (New) The medium as claimed in claim 37, wherein the calculating is carried out by simple summation of a cross-correlation coefficient between the reference image and the input image.

40. (New) The method as claimed in claim 18, wherein the calculating step comprises:

calculating an autocorrelation coefficient of the reference image by assigning a density distribution value of a background area of the reference image to a first constant value and by assigning a density distribution value of a foreground area of the reference image to a second constant value different from the first constant value;

calculating a sum of density values of the input image corresponding to a foreground area of the reference image;

calculating a sum of density values of the input image corresponding to a background area of the reference image;

calculating a cross correlation coefficient between the reference image and the input image for the foreground and the background areas; and

obtaining the normalized correlation coefficient by dividing the cross correlation coefficient by a product of the autocorrelation coefficients of the input image and the reference image.